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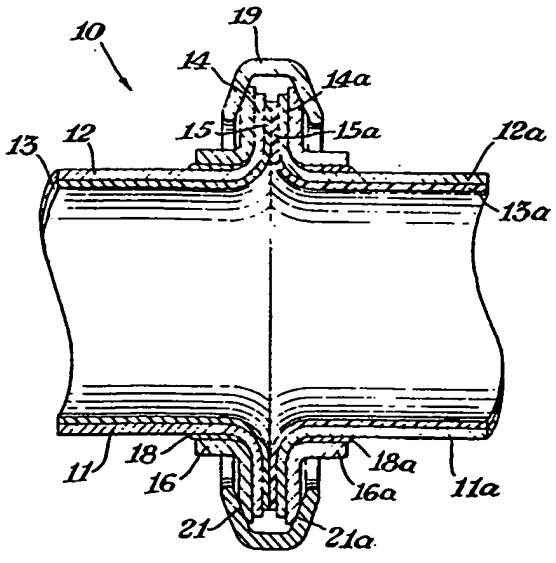
(54) **Plastic lined pipe joint and method of joining.**

(57) A pipe joint (10) is provided by flanging a lined pipe, disposing and adhering a loose ring (16, 16a) to each flange (14, 14a) and clamping the rings (16, 16a) with a split "V" type clamp (19), and applying an adhesive sealer (18, 18a) between the loose ring (16, 16a) and the conduit flange (14, 14a) for improved ease of handling and improved corrosion resistance.



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PLASTIC LINED PIPE JOINT AND METHOD OF JOINING

For many years pipes and like conduits have been employed to transport liquids of varying corrosive nature. Oftentimes materials which provide the desired resistance to corrosion do not provide adequate physical properties to resist the stresses normally applied to a pipe or similar conduit. Therefore, two-layer conduits have been employed wherein a corrosion resistant lining is applied to a conduit having the desired physical resistance, for example, rubber lined steel or wood lined steel pipe. Of considerable commercial importance are plastic lined steel pipes. Some such pipes are lined with a thermoset resin while others are lined with thermoplastic resins. For many applications a particularly desirable combination is a lined pipe suitable for relatively low pressure operations and of a sufficient light weight so that it is more readily handled than standard pipe.

Plastic lined pipe may be joined in a variety of ways. One highly desirable joint is prepared by removing a terminal portion of the pipe, applying a flange to the pipe and subsequently flanging the protuding liner to conform to the flange. Such techniques are disclosed

in U.S. Patent Nos. 3,335,484; 3,383,750; 3,390,442; 3,448,491; 3,461,505; 3,650,550. Means of joining such pipes are disclosed in U.S. Patent Nos. 3,284,107 and 3,284,108. Light weight plastic lined pipe is disclosed in U.S. Patent Nos. 3,838,823 and 3,742,590. A particularly convenient means of flaring both pipe and liner simultaneously is disclosed in U.S. Patent No. 3,744,115.

A very desirable means of joining lined pipe is disclosed in U.S. Patent No. 4,313,625 which makes use of a loose ring having a tapered surface disposed behind the flanges of the pipes to be joined. The loose ring is engaged by a split "V" clamp to provide the desired force to draw the pipe flanges together. However, the loose ring of U.S. Patent 4,313,625 can cause problems in assembly on a vertical run of joined pipes and particularly where the ring and the pipe define fissures or spaces therebetween where corrosive materials can collect unnoticed.

It would be desirable if there were available an improved lined pipe assembly which can be readily formed regardless of the orientation of the pipe or pipes to be joined.

These benefits and other advantages are achieved in a pipe joint comprising a plastic lined conduit having a synthetic resinous pressure deformable liner disposed within a pressure deformable metal conduit, said plastic lined conduit having at least one end defining a radially outwardly projecting flange composed of deformed metal of the metal conduit and deformed plastic of the liner, a loose ring having a generally planar face and a tapering face and disposed

about the conduit with the planar face disposed against the outwardly projecting flange of the metal conduit, the tapering face of the loose ring being remote from the radially outwardly projecting metal flange and tapering outwardly toward a periphery of the flange, a split "V" clamp disposed about the loose ring said "V" clamp having an opposed tapering surface engageable with the tapering face of the loose ring for forcing the plastic liner flange against an opposed liner flange engaging sealing surface, characterized by an adhesive sealer disposing between the loose ring and the adjacent pipe flange, said sealer being present in a quantity sufficient to adhere the loose ring to the conduit flange and fill any space which may be defined between the loose ring and adjacent conduit flange.

Also contemplated within the scope of the present invention is a method of forming a flange on a terminal end of a plastic lined conduit comprising a synthetic resinous pressure deformable liner disposed within a pressure deformable metal conduit, comprising the steps of positioning on said metal conduit a loose ring said loose ring being adapted to engage a split "V" clamp, hydraulically deforming the end of the plastic lined conduit to form a generally outwardly radially extending annular flange on the metal conduit and, on release of the hydraulic pressure, the flange of the liner extending primarily radially and to a lesser degree axially, the flanges of the liner and the metal conduit defining a space therebetween, rotating the lined conduit while applying a heated gas to the flange of the liner, the heated gas being applied for a sufficient time to heat plastify the liner flange, and characterized by the steps of applying an adhesive

sealer between the loose ring and the flange of the metal conduit, pressing the liner flange against the conduit flange while forcing the loose ring against the liner flange to thereby cause the adhesive sealer to fill any void defined by the loose ring and the conduit flange, cooling the liner flange below its heat plastifying temperature and removing a means to press the liner flange against the conduit flange.

Further features and advantages of the present invention will become more apparent from the following specification taken in connection with the drawing wherein the single Figure depicts a sectional view of a pipe joint in accordance with the present invention.

The pipe joint generally designated by the reference numeral 10 has a first conduit 11 and a second conduit 11a. The conduits 11 and 11a are deformable metal conduits 12 and 12a, respectively, having disposed therein synthetic resinous heat deformable liners 13 and 13a, respectively. The terminal portions of the metal conduits 12 and 12a define radially outwardly extending flanges 14 and 14a while the liners 13 and 13a terminate in radially outwardly extending flanges 15 and 15a, respectively. Each of the flanges 14 and 14a have associated therewith loose rings 16 and 16a. The loose rings 16 and 16a are disposed remote from the liner flanges 15 and 15a, respectively. Bodies of adhesive sealer 18 and 18a fill any fissures or spaces defined between the loose rings and the associated flange. A split "V" clamp 19 engages tapered faces 21 and 21a of the loose rings 16 and 16a, respectively. The action of split "V" clamp is such that on tightening the loose rings 16

and 16a are drawn together to provide sealing contact between the liner flanges 15 and 15a.

In preparing joints in accordance with the present invention, the loose ring is first positioned about the conduit with the tapered face 21 or 21a, oriented remote from the terminal end of the conduit. The conduit is then flanged. A particularly desirable method of flanging both the metal conduit and the liner is set forth in U.S. Patent No. 3,744,115. In many instances the flange of the liner 15 or 15a, will move away from the metal conduit flange 14 or 14a, and define a generally annular space between the flange of the conduit and the flange of the liner, such annular space having a generally wedge-shaped cross-sectional configuration. The thicker portion of the wedge-shaped space is remote from the axis of the conduit and the narrower portion of the wedge-shaped space is disposed toward the axis of the conduit. The liner flange 15 or 15a, is then heated to a temperature sufficient to heat soften or plastify the flange to a degree sufficient so that when forced into contact with the flange 14 or 14a of the metal conduit, the liner flange will remain in position against the conduit flange. Heating of the flange beneficially is accomplished by using a hot gas such as air. A desirable manner of heating the liner flange is to provide a blast of hot air against the liner portion extending from the metal conduit and rotate the lined conduit until the liner flange has been more or less evenly heated to the desired temperature. The heat plastified liner flange is then clamped against the conduit flange and permitted to cool. Such clamping is readily accomplished by employing a metal plate, for example, a steel plate.

Conduit lining materials are, for example, polytetrafluoroethylene (PTFE) copolymers of PTFE, polyvinylidene fluoride, polyvinylidene chloride or, polypropylene. Any polymer, including the above preferred polymers, which can be heat plastified can be flanged in the manner hereinbefore described.

An appropriate sealant is then applied between the loose ring 16 or 16a, and the adjacent flange 14 or 14a. Advantageously, the adhesive sealer is applied to a space between the loose ring and its adjacent flange during the heating of the heat plastifiable liner flange 15 or 15a, and simultaneously the liner is forced against its adjacent conduit flange and the loose ring forced against the conduit flange. The adhesive sealer may be any one of a variety of sealer materials and depend upon the application of the lined conduit. Hot melt adhesives are particularly desirable; however, they should have a softening point such that no dripping or movement of the adhesive sealer is observable at the operating temperature of the lined conduit when placed into service. A wide variety of useable hot melt adhesives are known to be useful in the practice of the present invention. Some of such hot melt adhesives are set forth in U.S. Patents 4,140,733; 4,141,744; 4,146,586; 4,148,775; 4,200,676; 4,214,019; 4,215,159; 4,217,376; 4,219,458; 4,219,459; 4,219,460; 4,222,976; 4,252,712; 4,283,317; 4,284,542; 4,289,669; 4,304,697.

Epoxy adhesives sealers are also usable in the practice of the invention, such as are set forth, for example, in U.S. Patents: 3,891,583; 3,945,971; 3,943,104; 4,110,313; and 4,117,038.

To ensure electrical conductivity between joined plastic lined pipe sections for cathodic protection, it is desirable to use adhesive sealers which are electrically conductive. Normally, synthetic resinous sealing materials are nonconductive and thus would prevent an electrical current to flow from one pipe section to the next when applied in the manner disclosed in the present invention. More particularly, the sealing material when applied between the metal pipe flanges 16 and 16a and the loose rings 16 and 16a would flow between the surfaces of the flanges and loose rings to coat the surfaces, thus forming an electrical insulator between the joined pipe sections to prevent an electrical current from flowing through a plurality of interconnected pipe sections. Electrically conductive adhesive sealers which may be employed in the invention include, for example, graphite filled synthetic resinous materials; resinous materials having metal in the form of a powder, fibers or particles dispersed therein; conductive inserts such as metal washers which may be perforated and expanded to form an expanded mesh. Synthetic resinous materials which are electrically conductive per se may also be used in the practice of the invention.

Conduits prepared in accordance with the foregoing are easily handled in the field, assembled in any position because of the loose ring being adhered to its associated conduit flange. As the adhesive sealer is disposed between the loose ring and the associated flange, accumulation of corrosive material between the loose ring and the flange is eliminated.

C L A I M S

1. A pipe joint comprising a plastic lined conduit having a synthetic resinous pressure deformable liner disposed within a pressure deformable metal conduit, said plastic lined conduit having at least one end defining a radially outwardly projecting flange composed of deformed metal of the metal conduit and deformed plastic of the liner, a loose ring having a generally planar face and a tapering face and disposed about the conduit with the planar face disposed against the outwardly projecting flange of the metal conduit, the tapering face of the loose ring being remote from the radially outwardly projecting metal flange and tapering outwardly toward a periphery of the flange, a split "V" clamp disposed about the loose ring said "V" clamp having an opposed tapering surface engageable with the tapering face of the loose ring for forcing the plastic liner flange against an opposed liner flange engaging sealing surface, characterized by an adhesive sealer disposing between the loose ring and the adjacent pipe flange, said sealer being present in a quantity sufficient to adhere the loose ring to the conduit flange and fill any space which may be defined between the loose ring and adjacent conduit flange.

2. The pipe joint of Claim 1 wherein the adhesive sealer is a hot melt adhesive.

3. The pipe joint of Claim 1 wherein the adhesive sealer is an epoxy resin.

4. The pipe joint of Claim 1, wherein the adhesive sealer is electrically conductive.

5. The pipe joint of Claim 1, 2 or 3, wherein the adhesive sealer is provided with an electrically conductive material.

6. The pipe joint of Claim 5, wherein the electrically conductive material is a metal powder or particulate dispersed in said adhesive sealer.

7. The pipe joint of Claim 5, wherein the electrically conductive material is perforated metal washer or an expanded mesh metal insert.

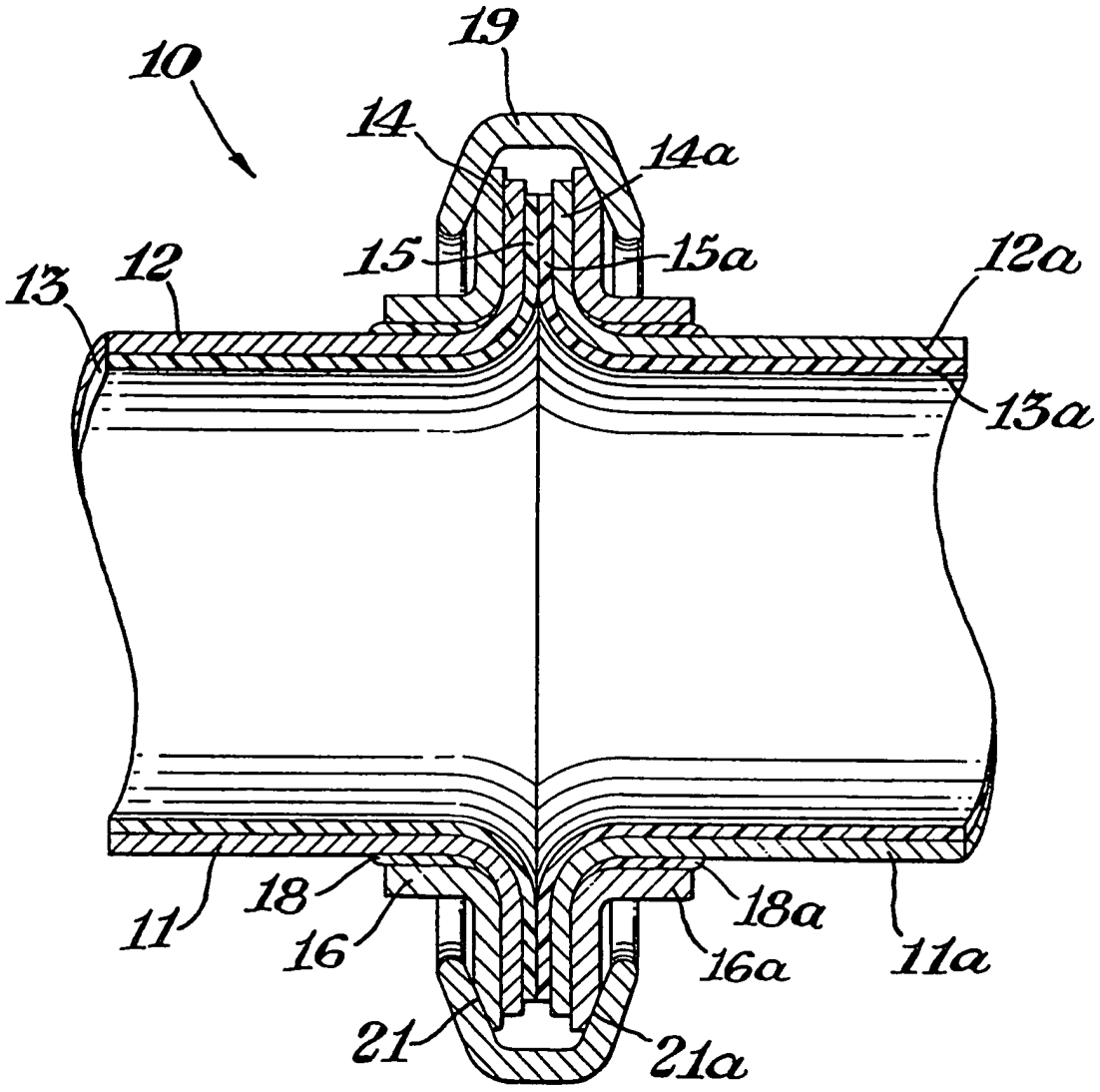
8. A method of forming a flange on a terminal end of a plastic lined conduit comprising a synthetic resinous pressure deformable liner disposed within a pressure deformable metal conduit, comprising the steps of positioning on said metal conduit a loose ring said loose ring being adapted to engage a split "V" clamp, hydraulically deforming the end of the plastic lined conduit to form a generally outwardly radially extending annular flange on the metal conduit and, on release of the hydraulic pressure, the flange of the liner extending primarily radially and to a lesser degree axially, the flanges of the liner and the metal conduit defining a space therebetween, rotating the lined conduit while

applying a heated gas to the flange of the liner, the heated gas being applied for a sufficient time to heat plastify the liner flange, and characterized by the steps of applying an adhesive sealer between the loose ring and the flange of the metal conduit, pressing the liner flange against the conduit flange while forcing the loose ring against the liner flange to thereby cause the adhesive sealer to fill any void defined by the loose ring and the conduit flange, cooling the liner flange below its heat plastifying temperature and removing a means to press the liner flange against the conduit flange.

9. The method of Claim 8 wherein the adhesive sealer is selected from a hot melt adhesive or an epoxy resin.

10. The method of Claim 8 wherein the adhesive sealer is electrically conductive.

11. The method of Claim 8 wherein the adhesive sealer is provided with an electrically conductive material selected from metal or graphite.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European Patent Office

EUROPEAN SEARCH REPORT

0100580
Application number

EP 83201147.2

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	DE - A - 2 425 637 (THE DOW CHEMICAL CO.) * Totality * --	1	F 16 L 58/10 F 16 L 23/04
A	US - A - 3 828 823 (THE DOW CHEMICAL. CO.) * Totality * --	1	
D,A	US - A - 4 214 019 (DONERMEYER) * Totality * --	1,2,9	
D,A	US - A - 4 215 159 (DONERMEYER) * Totality * --	1,2,9	
D,A	US - A - 4 217 376 (DONERMEYER) * Totality * --	1,2,9	TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
D,A	US - A - 4 283 317 (OMIKA) * Totality * --	1,4,10	F 16 L 9/00 F 16 L 23/00 F 16 L 25/00 F 16 L 58/00 B 23 P 7/00 C 08 L 63/00
D,A	US - A - 4 313 625 (THE DOW CHEMICAL CO.) * Totality * ----	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	06-10-1983	SCHUGANICH

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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